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ADDITIONAL GROUNDWATER ASSESSMENT WORK IN THE WASTE PIT AREA

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Introduction.

The Feed Materials Production Center (FMPC) will conduct additional groundwater assessment work (as outlined in this document) in the Waste Pit Area under the Remedial Investigation Feasibility Study (RI/FS) program. The additional groundwater assessment work is needed to address technical issues in the RI/FS process, and requirements of the Resource Conservation and Recovery Act (RCRA).

The FMPC is investigating the nature and extent of hazardous substances at the FMPC through a CERCLA RI/FS program in accordance with a Compliance Agreement between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). A RCRA Groundwater Quality Assessment Program (GQAP) at Waste Pit #4 is being conducted in concert with the RI/FS program to address requirements of RCRA regulations as they apply to Waste Pit #4 at the FMPC. Waste Pit #4 is currently being evaluated for a response action under Operable Unit 1 of the ongoing RI/FS. Pursuant to the Consent Agreement, RCRA is being considered as an Applicable or Relevant and Appropriate Requirement (ARAR) in the RI/FS process.

The controlling document for the RCRA-GQAP is Revision 1 of the FMPC Groundwater Quality Assessment Program Plan (GQAPP), dated March 1989[1]. The latest assessment program results can be found in the FMPC RCRA Annual Report for Calendar Year 1989[2] and the RCRA Groundwater Quality Assessment Program Progress Report, Revision 1[3].

Monitoring well 1031 is one of the wells included in the RCRA-GQAP. On July 13, 1990 the OEPA was issued a letter concerning groundwater test results from Monitoring Well 1031. The letter stated that test results from Monitoring Well 1031 verified the presence of six volatile organic compounds (VOC's), which are listed in Appendix IX of 40 CFR 264. The detection of these compounds in Monitoring Well 1031 is of concern to the FMPC, and has led to a decision to conduct additional assessment activities in the area of well 1031 as part of the RI/FS Program. These additional assessment activities will be incorporated into the RI/FS Work Plan and the GQAPP. A commitment was made to the OEPA in the July 13th letter to provide the OEPA with a proposal for further investigation of the extent and rate of migration of the compounds detected. This document serves to satisfy that commitment.

VOC Test Results for Monitoring Well 1031

The FMPC RCRA Groundwater Quality Assessment Program (GQAP) has conducted ten quarterly groundwater sampling rounds in the Waste Pit Area (May, 1988 to August, 1990). Monitoring Well 1031 monitors a water bearing zone in the glacial till located just south of the Clearwell and Waste Pit #1, Figure 1. The glacial till is monitored at this location because the glacial till is a potential contaminant pathway for contamination between the waste pits and the underlying Great Miami Aquifer.

VOC test results taken at Monitoring Well 1031 from September 1989 to May 1990

are tabulated in Table 1. In September of 1989 an Appendix IX sampling was conducted. Some of the data from the Appendix IX testing were not available for assessment work until late May of 1990; an (*) identifies this data in Table 1. When February test results were received, it was thought that only six VOC's were being detected. A notification of the detection of six VOC's in monitoring well 1031 was sent to the Ohio Environmental Protection Agency on July 13, 1990. Test results for the groundwater sample, which was collected from well 1031 on May 04, 1990, indicated the presence of other VOC contaminants as well. A notification letter informing the OEPA of the May test results was issued by the DOE on August 01, 1990. Test results from August of 1990 have not been received as of September 28, 1990.

When the Appendix IX testing results from September of 1989 are included in the assessment it is apparent that well 1031 may contain more constituents than the six that have already been confirmed. An additional Appendix IX sampling will be conducted in October 1990. The test results will be transmitted to the OEPA within 20 working days from when they are received from the lab.

Geology and Hydrology of the Glacial Till

Much has been learned about the geology and hydrology of the glacial till through the RI/FS Program since the GQAPP was issued in March of 1989. Results of the assessment work performed in the Waste Pit area as part of the RI/FS program will be published this fall. Highlights of the information which will be presented in that publication are presented here to support the additional assessment activities being conducted in the Waste Pit Area. Although new assessment activities are being conducted for the RCRA program, the assessment goals outlined in the GQAPP remain the same. The following represents what has been learned about the glacial till in the Waste Pit Area since the GQAPP was issued.

Lateral Continuity of Water Bearing Zones in the Waste Pit Area:
In past reports, water levels and parameter concentrations in the Waste Pit Area have been mapped in the glacial till as one unit. Through progressive assessment work conducted in the Waste Pit Area on the glacial till (cross sections, fence diagrams etc.) it has been documented that the till in the Waste Pit Area is very heterogeneous. Within the glacial overburden there appears to be numerous small perched water-bearing zones with limited interconnection. Till lithology indicates that the perched zones were deposited in a glaciofluvial environment. They contain thin discontinuous beds (both laterally and vertically) of well-sorted sands and gravels. It is believed that these beds were deposited in small meltwater streams that once existed along an ice margin and/or beneath a glacier.

Potential to be a Source of Recharge to the Underlying Sand and Gravel Aquifer:
The glacial till represents a potential pathway for contaminant migration from the waste pits to the underlying sand and gravel aquifer. The potential for this migration appears to be low. The glacial till appears to be chemically weathered and the depth of weathering varies across the Waste Pit Area. Infiltration is primarily limited to the weathered zone. While precipitation enters this weathered zone, it does not appear to act as a significant source

of recharge to deeper aquifer zones. The majority of the water is lost from the glacial till through evapotranspiration before it ever reaches the underlying sand and gravel. In addition it is believed that some water may discharge laterally to small seeps or drainages.

Hydraulic Conductivity of the Glacial Till:
Hydraulic conductivities for perched water bearing zones in the glacial till near the Waste Pit Area range from 2.5 X 10^{-6} cm/sec to 1.3 X 10^{-4} cm/sec, Table 2. As a result of increased lateral stresses caused by overburden loading, as well as decreased weathering, the hydraulic conductivity of till generally decreases with depth. The hydraulic conductivity values presented above were calculated from on-site slug tests, and represent very localized areas within the till.

Source of Contamination in the Glacial Till in the Waste Pit Area:
Due to the heterogenous nature of the till, it is very doubtful that contamination could migrate through the till any great lateral distance. If the glacial till is contaminated the most likely source of the contamination is the immediate area. If the contamination is close to a waste pit the most likely source is the pit. Another possible source of contamination though, could be past episodes of surface runoff that carried contamination to a place where localized infiltration took place.

Additional Assessment Activities

It appears, (based upon the current understanding of the geologic and hydrologic nature of the glacial till) that extensive lateral migration of waste constituents in the glacial till (as if the till behaves as an aquifer) is not very probable. Vertical localized percolation of contamination through the glacial till down to the sand and gravel aquifer, or seepage of contamination out of the glacial till (where the contamination could potentially recharge an exposed unit of the sand and gravel aquifer) is the most realistic contaminant pathway from the waste pits to the sand and gravel aquifer. Flow in the glacial till can be treated essentially as one dimensional.

In response to the data collected at monitoring well 1031 and current knowledge of the geology and hydrology of the glacial till the GQAPP is being revised to address the glacial till as essentially a one dimensional flow system. The FMPC has already initiated additional assessment work in the Waste Pit Area per the assessment strategy outlined in the GQAPP. The following is a summary of the work that has been initiated.

An additional Appendix IX testing of the groundwater in monitoring well 1031 has been scheduled for early October 1990. A copy of the lab report will be released to the EPA within 20 working days from when it is received from the lab.

A 2000-series monitoring well (2649) is being drilled next to Monitoring Well 1031 to determine if the sand and gravel aquifer beneath 1031 has been contaminated, Figure 1. Once the well has been developed, water from the well will be tested for site-specific Appendix IX parameters. Sampling and analysis will be conducted in accordance with the GQAPP and the RI/FS Work Plan.

A better monitoring system is being installed around Waste Pit #4. Four new till

monitoring wells (1643, 1644, 1645, and 1646) are currently being drilled to closely encircle Waste Pit #4. Two additional 2000-series wells (2643 and 2648) are being drilled to monitor the sand and gravel aquifer immediately upgradient and downgradient of Waste Pit #4, Figure 1. Once these wells have been developed they will be tested for site-specific Appendix IX parameters. Sampling and analysis will be conducted in accordance with the GQAPP and the RI/FS Work Plan.

The 4000-series monitoring system is being improved. A 4000-series monitoring well (4011) is being drilled upgradient to the Waste Pit Area, Figure 1. Once this well has been developed it will be tested for site-specific Appendix IX parameters. Sampling and analysis will be conducted in accordance with the GQAPP and the RI/FS Work Plan.

Reporting

The additional groundwater assessment work outlined in this document (for the purpose of addressing CERCLA regulations) will be conducted, reported and submitted to the EPA in accordance with the RI/FS Quality Assurance Project Plan[4], and (for the purpose of addressing RCRA regulations) will be conducted, reported and submitted to the OEPA in accordance with the GQAPP.

REFERENCES

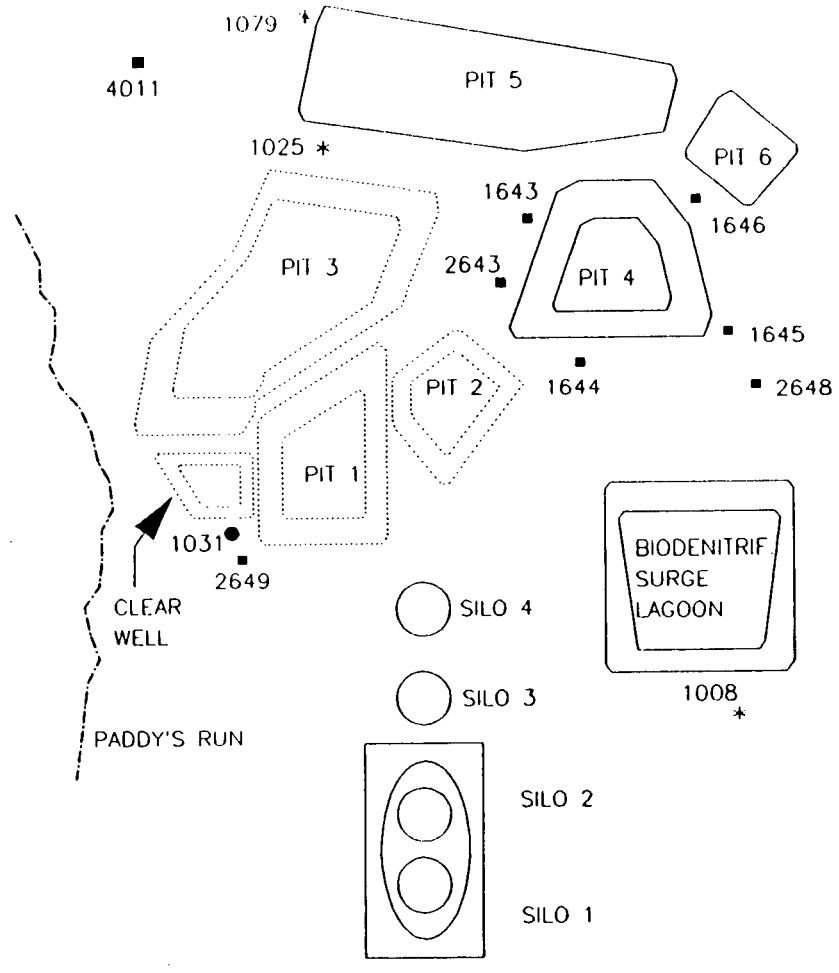
1. Groundwater Quality Assessment Program Plan for Waste Pit No. 4 at the Feed Materials Production Center, Revision 1., prepared by Westinghouse Materials Company of Ohio for the United States Department of Energy, Feed Materials Production Center, Cincinnati, Ohio, March 1989.

2. FMPC RCRA Annual Report for Calendar Year 1989, prepared by Westinghouse Materials Company of Ohio for the United States Department of Energy, Feed Materials Production Center, Cincinnati, Ohio, March 1990.

3. RCRA Groundwater Quality Assessment Program Progress Report, Revision 1., prepared by Westinghouse Materials Company of Ohio for the United States Department of Energy, Feed Materials Production Center, Cincinnati, Ohio, May 1990.

4. Remedial Investigation and Feasibility Study, Feed Materials Production Center, Fernald, Ohio, Volume V: Quality Assurance Project Plan, Revision 3, United States Department of Energy, March 1988.

FIGURE 1



WELL LOCATIONS ARE APPROXIMATE

NOT DRAWN TO SCALE

KEY

..... ZONE BOUNDARY

* HYDRAULIC CONDUCTIVITY DATA

• NEW WELLS

• MONITORING WELL

NOT ALL RCRA WELLS SHOWN

MAP OF WASTE PIT AND K-65 AREA

Table 1

Hazardous Waste Constituents Found In Well 1031
(Concentrations in ug/L)

Constituent	September 1989	November 1989	February 1990	May 1990
1,1-Dichloroethane	30.0	45.0	37.2	21.4
2-Propanone (Acetone)	15.0	<12.5	78.0	30.7
Methylene Chloride	6.0 B	<12.5	5.0	5.0
Tetrachloroethene	300.0 E	248.0	126.0	150.0
Toluene	2.0 J	<12.5	1.5	1.1
Trichloroethene	530.0 E	527.0	214.0	137.0
Benzene	3.0 J*	-	-	2.6
Chloroform	2.0 J*	-	-	1.6
1,2 - Dichloroethane	2.0 J*	<12.5	2.6	1.8
1,1 - Dichloroethene	5.0 •	-	-	5.6
4-Methyl-2-pentanone	6.0 J*	-	-	5.9
1,1,1-Trichloroethane	-	-	-	1.7
Vinyl chloride	16.0 •	-	-	7.0
1,2 - Dichloroethene	-	-	-	77.7
2,3,4,6 - Tetrachlorophenol	4.0 J*	-	-	-
2 - Butanone	3.0 J*	-	-	-
2 - Nitrophenol	12.0 •	-	-	-
4 - Nitrophenol	11.0 J*	-	-	-
N - Nitrosodiethylamine	4.0 J*	-	-	-
N - Nitrosodithylamine	3.0 J*	-	-	-
Naphthalene	2.0 J*	-	-	-
Pentachlorophenol	3.0 J*	-	-	-
Phenol; 2-Methyl-4,6-dinitro-	6.0 J*	-	-	-
Total Xylenes	2.0 J*	-	-	-
trans-1,2 - Dichloroethene	18.0 •	-	-	-

< = Indicates that the value was non-detectable, or below the detection limit of the detector. In order to determine the high concentrations of the Trichloroethene and Tetrachloroethene in the November 1989 sample, the solution had to be diluted. When the sample was diluted, the detection limit for Acetone, Methylene Chloride, and Toluene was reported as 12.5.

B = Indicates that the analyte was found in the associated blank as well as the sample

E = Indicates a compound whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J = Indicates a value that was estimated by the laboratory because the result was below the detection limit but not zero.

- = Parameters not tested.

• - The data indicated by an asterisk was not available for assessment until May, 1990.

TABLE 2

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SUMMARY OF HYDRAULIC CONDUCTIVITY DATA COLLECTED FROM GLACIAL TILL MONITORING WELLS IN THE WASTE PIT AREA

MONITORING WELL NO.	SUBSURFACE SOIL TYPE	HYDRAULIC CONDUCTIVITY (CM/SEC)
1008	Clay, Trace Gravel	1.3×10^{-4}
1025	Clay, Trace Gravel	2.5×10^{-6}
1079	Clay, Some Sand, Some Gravel	1.8×10^{-5}

NOTE: Data comes from a slug test program which was conducted as part of the RI/FS. Details of the slug test program will be published in an RI/FS Groundwater Report due out in the Fall of 1990.

The locations of the above wells are noted on Figure 1.